

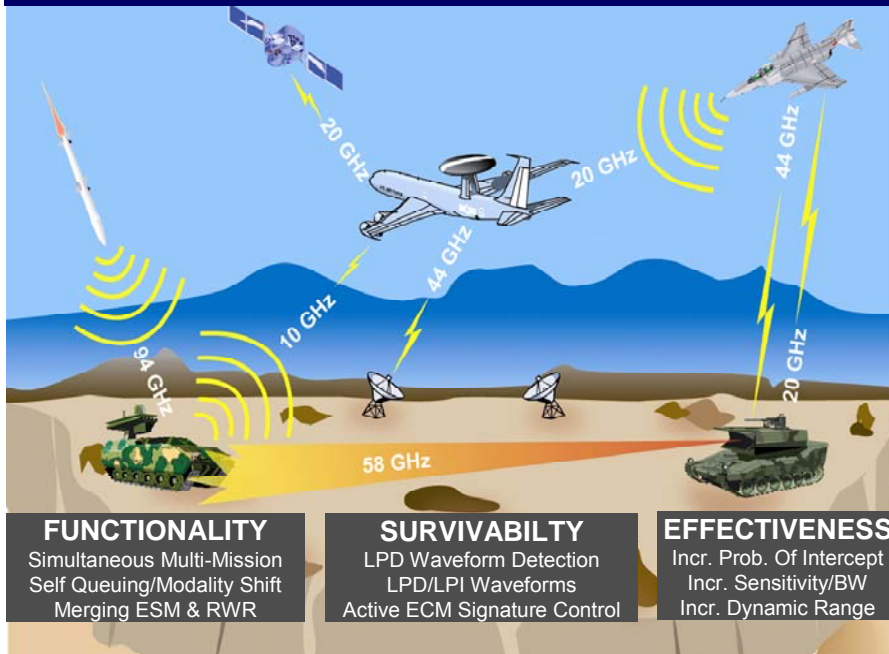


Analog Optical Signal Processing (AOSP)



Addressing Need for Maintaining Our National Position:

- Spectral dominance, global awareness & rapid response



Enabling Network Centric Operations via RF Photonics

• Goal:

- Demonstrate Analog Optical Signal Processing Components and Modules that extend Dynamic Range-Bandwidth and Time-Bandwidth limits on RF antenna systems by 1000x
 - Instantaneous Bandwidth (IBW): 1 GHz \rightarrow 100 GHz
 - Time Aperture (TA): 10 ms \rightarrow 1 ms
 - Dynamic Range (SFDR): 110 dB-Hz^{2/3} \rightarrow 120 dB-Hz^{2/3}

• Technical Challenges:

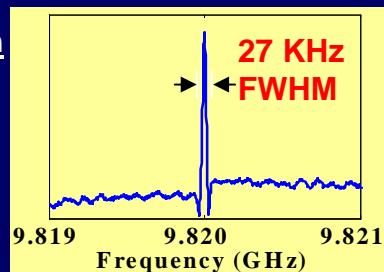
- RF Performance
 - Linearity (SFDR)
 - Sensitivity (Noise Figure)
- Hybrid Chip-Scale Integration
 - Insertion loss
 - On-chip time delay
 - Fast material response times
 - New device/integration approaches

• Impact

- Simultaneous Multifunction Payloads: GMTI, AMTI, High Resolution SAR, Electronic Warfare, Signals Intelligence
- Multi-Static Operations: Resolve difficult targets & tracks
- Dynamic Reconfiguration: Ad hoc networking for fully integrated tasking, processing, exploitation & dissemination
- Alleviates RF front-end performance limitations enabling full use of emerging EW receiver and ADC technologies

Fast Readout of Captured Spectrum with Time*Bandwidth ~ 400,000

- 27 kHz Resolution
- Readout of spectrum near 10GHz
- Scan rate of 0.1GHz/ms is 100x faster than conventional limit for resolution of 27 kHz



Thrusts

- RF Channelizer, RF Spectrum Analyzer, Agile RF Filter, Arbitrary Waveform Generator

